in a streetlike geometry, while the dislocation density is significantly reduced in between the streets. However, despite the presence of dislocation from the very beginning (!), ingots of up to 700-mm length can be Cz-grown with multiple recharges at increased pull speed (see Figure 6.3). This is in fundamental contrast to the traditional c-Si growth with (100) orientation where dislocations must be completely avoided because otherwise the crystalline structure is totally lost after only a few centimetres of dislocated growth due to rapid dislocation multiplication. This peculiar structural stability of tri-Si, studied in detail through a geometrical stress model, is attributed to a reduction of cross slip in the tri-Si structure [7, 8].

Regarding electrical properties, ELYMAT mappings [9] show that there is a good spatial correlation between dislocation density and minority-carrier diffusion length: areas of high dislocation density show low diffusion length values. For dislocation lean ingots with 4- to 10-Ωcm resistivity, diffusion length values of more than 1000 μm (see Figure 6.4) can be obtained before light-induced degradation (LID).

The LID of the diffusion length of Cz-Si has recently been investigated extensively by several groups [1, 10, 11]. Although the identification of the defect structure is yet

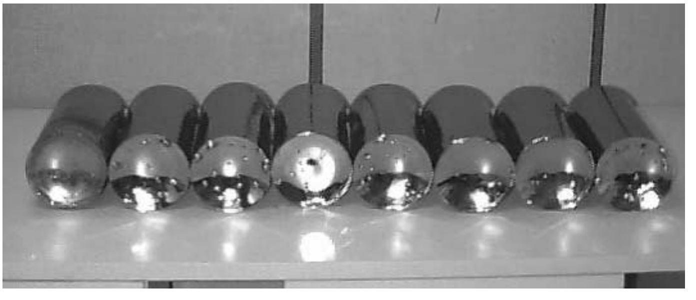

Figure 6.3 Tri-Si ingots (Ø140 mm) from quasi-continuous pulling

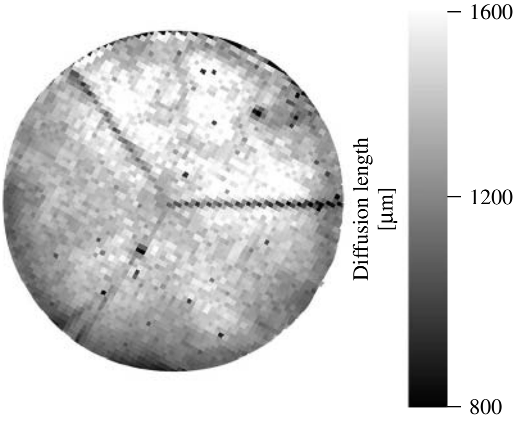

Figure 6.4 Diffusion length map of a 10-Ωcm as-grown wafer cut from the top of a dislocation lean tri-Si ingot. Lateral average diffusion length is 1300 μm